MISCELLANY.

PROPORTIONAL REPRESENTATION.

An earnest effort to abolish the "gerrymander" will probably lead to the conclusion that the district system must be abandoned. To do this in Congressional elections, it will not be necessary to return to the system of a general state ticket elected by the majority party of each state, which was the custom in the first quarter of the century, and which is still employed in the case of the presidential electors. A modification of that discarded system could be adopted by introducing some simple device of proportional representation.

Proportional representation is not a new thing in politics, although it has heretofore received but limited application. Twenty years ago there was abundant discussion of plans for minority and proportional representation, and out of the discussion in our own country a crude plan of cumulative voting was adopted by some of the municipalities of Pennsylvania, and for the election of members of the lower house of the Illinois legislature. This plan is still in force. It has been recently applied to all private corporations by the new constitutions of Kentucky, North and South Dakota and Montana. The Illinois system for the election of state representatives was submitted to the people by the Constitutional Convention of South Dakota, but was defeated at the polls. In Denmark, another plan of minority representation has been in force since 1856. But the most important application of proportional representation has been made by the Canton of Neuchatel, in Switzerland, and more recently by the Canton of Ticino. Something like the Swiss plan could be profitably adopted in the election of all our representative assemblies and boards.

For Congressional elections, let each state elect its entire quota of representatives on a general ticket. Let each party in the state convention nominate the entire list, or as many candidates as it could probably elect, adding a few names for favorable contingencies. Then, in canvassing the returns, let the representatives be assigned to each party in proportion to the popular vote of the party, giving preference to the candidates according to their standing on the vote.

For example, Ohio, in the elections of 1890, cast 713,152 votes for Congressmen. The number of Congressmen to be elected was twenty-one. This gives a quota of 33,959 votes to each Congressman. The Republicans cast 362,624 votes, which gives them ten representatives and a remainder of 23,034 votes. The Democrats cast 350,528 votes, giving them ten representatives and a remainder of 10,928 votes. The Prohibition vote was 21,891, and the Union Labor vote 3,223. There being twenty-one representatives to elect, and the Republicans having a remainder above their ten quotas larger than the Democratic remainder, and larger than the total Prohibition or Union Labor vote, they get the additional representative. Thus, the Ohio delegation would stand eleven Republicans and ten Democrats. At present, under the gerrymander of 1890, it is seven Republicans and fourteen Democrats.

In the election of state legislatures, the state could be divided into districts, each electing five, seven, or some odd number of representatives, and the electors of each district would vote for the entire list of names on their party ticket, the quotas and proportions being obtained as above. For example, the county of Cuyahoga (including the city of Cleveland) sends repeatedly a solid delegation of six Republicans to the Ohio State Legislature, elected on a general county ticket, and not one Democrat. By the proportional system, there would be three Democrats and three Republicans. The county of Hamilton (including the city of Cincinnati) sends to the Sixty-ninth General Assembly a solid delegation of nine Democrats. The Republicans of that

county are unrepresented. With proportional voting, the delegation would stand five Democrats, four Republicans. Other counties in the state send one representative each. They could be grouped into districts of five, and could then vote on the proportional plan.

In cities, election districts for councils and boards of aldermen could be constructed on a similar basis. Where there are two branches of the city legislature, the smaller branch could be chosen on a general ticket for the city at large by the proportional system, and the more numerous branch by districts of five.

In all elections upon this plan, the different party tickets could be printed on a single ballot, according to the form of the Australian ballot. The order of names on each ticket would be determined by the state convention of each party, and this would indicate the order of preference of the party. Voters would not vote for individuals, but for the ticket. If individual voters took the liberty of changing the order of names, they would lose their vote altogether. This provision is necessary in order to simplify the counting of the ballots. But "bolters" could nominate a new ticket, and at the same time assist in electing the party ticket, simply by placing their first choice at the head of their ticket and following it by names taken from the regular ticket. If they were sufficiently numerous to comply with the law, the privilege could be obtained of having this new ticket printed separately on the Australian ballot. If, now, the voters of this ticket could command a quota of the entire vote, they would elect their first choice, and any remainder above the quota would go to the next name, thus helping to elect one of the regular party nominees. The new system would thus involve no waste of votes.

The plan here outlined is a modification of one devised by Dr. L. B. Tuckerman, of Cleveland, Ohio, who has developed it with special reference to the election of committees by conventions or mass-meetings. In such assemblies the one-man power of the chairman is done away with, and each

party can be fairly represented on committees by its own first choice.

To set forth all the advantages of proportional representation would require an extended study of politics and parties, and a careful weighing of remote causes. For the present, it is possible to point out only a few of the patent benefits it would confer. In the first place, the gerrymander would be absolutely abolished. No other feasible plan can be thought of that will do this. The gerrymander inheres in the district system. So long as it is possible to redistrict a state, it is hopeless to expect that a party in power will refrain from doing so to its own advantage. The changes of population necessitate redistricting at least once in ten years. If legislatures be prohibited from passing such an act within a period less than ten years, the party which happens to be in control of the legislature at the legal time will fasten its own gerrymander on the people for a decade, with no possible chance for redress. It is better to let the two parties play against each other.

Public opinion cannot stop the gerrymander, because public opinion rejoices in this kind of tit-for-tat. The fact that one party has infamously cut up the state is good reason for the other party to retrieve itself when it gets the power. If Congress should take the matter out of the hands of the State Legislature, it would be simply to do its own gerrymandering, while state and municipal gerrymandering would still go on as before. Constitutional restrictions, requiring equal population and contiguous territory, are easily evaded. Notwithstanding such restrictions, the populations of Congressional districts in New York vary from 107,844 to 312,404. In no state is the Constitution on this point observed. And as for contiguity, a glance at the diagram of the Eighth district of North Carolina or the First and Third districts of South Carolina will show on what a slender thread this fiction may be made to hang.

It seems plain that with proportional representation abler men would be attracted into legislative careers. The area

of choice would be enlarged, and the leaders of a party could not be driven from legislative halls where their ability is needed, as was done at the last Congressional election. The feeling of responsibility to the whole people would be increased in the leaders of parties, because they could stand on their record before the state at large, and not be compelled to dicker with petty local magnates. A man is at present elected to Congress, not on account of public service, but according to his ability in turning spoils and appropriations into his district. He does not represent before the country any great policy on which to stand or fall. He must depend on local wire-pulling and the exchange of favors. If he has done some distinguished service for his party, or has reached eminence in politics, the whole strength of the National party of the opposition is thrown into his district, and if possible, he is gerrymandered out of office.

Right here, however, will arise the principal popular objection to this plan, namely, that districts would not be represented. But a slight thought will show that this objection has no force. The gerrymander has taken nearly all the virtue out of a district that it may ever have possessed. There are few Congressional districts that have a unity of any kind, either economical, political, topographical, geographical or historical. The county of Huron, in Ohio, has been in five different combinations during the past twelve years, and now it is in the western part of a district one hundred and twenty miles long and twenty wide; its Congressional representative lives sixty miles away, and had, previous to the last gerrymander, very little knowledge of or interest in the county. In this, and hundreds of other cases, the candidates in some districts at the other end of the state are better known to the voters of the district than are the candidates in their own district. On the other hand, the state is a historical and political unit. Its great men belong to no one district. At present only two of them can go to the United States Senate, and others are shelved as govern-

ors, or are compelled to seek some Presidential appointment. Under proportional representation those who are unavailable for Senators would lead their party delegations in the House.

Arguments for proportional representation have usually been advanced in behalf of minorities. But they are equally valid as a defence of the majority. Under the system of districts and primaries less than ten per cent. of the voters of a party often dictate the policy of the party. Machines and ward bosses are the party rulers, and the majority does not dare to "bolt" at the polls, because the opposite party would then come into power. Proportional representation would permit independent movements within the party without risking the defeat of the entire ticket, simply by allowing the nomination of a new ticket composed partly of independents and partly of the regular ticket. If the independent candidates are elected and there is a surplus of voters above the quota, the surplus goes to the regular ticket. The majority of the party would be benefited as often as the minority. The present system on the face of it means the rule of the minority. The gerrymander overthrows majority rule.

The fact that voters could not vote for individuals, but must cast their ballots for the straight ticket, may seem at first sight a serious objection. But the objection is not valid as against the present system, because even now the voter has no choice except between party tickets, while under the proposed plan independent movements are made possible without risking the complete defeat of the party.

Other objections might be noted. A small third party would be likely often to hold the balance of power. The probability is, however, that there would be no occasion for third parties, because reforms inside the old parties would promptly gain a hearing, and compromises would head off radical "bolts."

The strongest objections are those which come from inertia and the dread of change. Constitutional amendments will be necessary in some cases, though Congress has complete

power in the matter of National representatives. Nevertheless, representative government is not something absolute and fixed in the nature of things. It is the result of circumstances and experiments without any great amount of political analysis or design. It grew out of the primitive mass-meeting, or folk-moot, simply because distant electors could not conveniently come up to the annual meetings. In the folk-moot the minority was, of course, fully represented. How they should be represented in the delegate assembly was at first a problem, but its solution was abandoned. The history of Colonial Maryland* shows, in an interesting way, how this came about. The original deliberative and legislative body was a primary assembly, where any freeman might speak and vote. In the second assembly—1638—voting by proxy was allowed to those freemen who could not be present in person. Abuses of this device led to the issuing of writs to the local divisions, instructing them to return representatives. But realizing that those who did not vote for the successful candidates would be unrepresented, individuals who were in the minority were allowed to appear in their own right. The third assembly was therefore an anomalous body, comprising the governor and his nominees, the duly elected representatives of localities, those individuals who had not consented to the election of representatives, and the proxies of other unrepresented individuals. Such a heterogeneous mass was neither representive nor primary, and was so threatening to the representative element that the hope of minority representation was given up in despair and the assembly defined its own constitution by limiting popular representation to the elected deputies, and ruling out proxies. Doubtless other colonies went through similar experiences.

The system finally adopted is rigid in the extreme. It has endured because there has been no special strain. But the growing intensity of class divisions and the immensity of the interests involved call for a more elastic system. Proportional

* Doyle, English Colonies in America.

representation seems to meet this requirement in every essential particular.

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THE STATE AND THE LIGHTING CORPORATIONS.

The business of furnishing illuminating gas is, of necessity, a monopoly. This fact is generally recognized in Europe, but has, as yet, been only partially accepted in this country.

If a person will look at the history of the various attempts to reduce the price of gas by the admission of competing companies, he will be compelled to admit that the effect of these on the price lasts but a short time, while the streets receive new lines of mains, to increase the already great underground confusion, and the capital put into these mains is wasted.

After two or more companies have engaged in a war of rates, with its consequent frequent changes of consumers from one company to the other, one of three things happens: the companies raise the price to a remunerative rate, and agree to make the rate of all the same; or they apportion the territory to be supplied among themselves, agreeing each to remain in its own district; or one buys out the others.

In other words, competition ceases, and we find prices higher, and probably higher than the state of the business should warrant; for the companies, when they agree to cease competition, usually succeed in re-arranging their capital in such a way as to convert into share capital the losses they may have suffered during the rate war.

The price of gas depends, however, quite as much on the amount of capital invested per unit of product as on the cost of production; or, to state it differently, a large part of the cost to the consumer is the interest on the cost of plant.

This being the result of competition, let us see what has been done in other directions toward protecting both consumers and companies. Municipal ownership is the cure

suggested by many, but many also object to so far increasing the power of the municipality as to make it a producer, the grant of that power being a long step towards state socialism. Facts are cited freely for and against municipal ownership from the experience of municipalities in this or other countries, and the deductions from the figures given are largely influenced by the desire of the writer to prove his side of the question.

England has provided for municipal ownership, but has distinctly recognized the principle of non-competition between a municipality and a private company, by providing that, in each case, the local authorities must buy out the existing company, and most of the acts provide that the purchase price shall be fixed by the earning capacity of the plant.

Besides this solution, we find in actual practice two other forms of control—one in England and the other in Massachusetts; and it is the intention of this paper to discuss fully the method employed in the latter State.

Until 1860, England, and especially London, had competition, and London was supplied with gas by thirteen companies. By the Metropolis Gas Act of that year, the principle of non-competition was recognized, and London was divided into nine districts, since reduced by consolidations to three, in each of which one company was to supply gas. The next step was taken in the Gas Works Clauses Act of 1871, and was intended to offer an inducement to the stockholders to reduce the price of gas as speedily as possible. This was arranged for by the "sliding scale," which was based on the assumption that it was possible to establish a standard price for gas and a standard rate of dividend. These once fixed, the act provides that, for every penny of reduction or increase in the price of gas, the rate of dividend should be increased or decreased by one-quarter of one per cent., the effect of this being to share between the stockholders and the consumers any changes in the cost of production.

It was found in practice, however, that there was a flaw in this act, inasmuch as no provision was made in regard to capital, with the result that capital was continually issued, and the standard price and the standard rate of dividend were maintained, or in other words, the whole saving by new economies went to the shareholders. This evil was corrected in 1877, by the introduction into the act of the "auction clauses," which provided that new share capital should be sold at public auction, and the whole proceeds, including any premium received, should be applied to the purposes of the company, but none of such proceeds were to be used for the payment of dividends. With this complement, the sliding scale has accomplished its object, and the reduction in the price of gas in England has been very marked.

Massachusetts has had, since 1860, a statute fixing a standard quality of gas, and providing for a State Inspector, who was also to test meters for their correctness, but in 1885, a distinct step forward was made in the direction of the recognition of the monopolistic nature of the gas supply and the propriety of the regulation of that monopoly by the state.

This the legislature of that year provided for in an act, bearing the title, "An act to establish a Board of Gas Commissioners," the principal provisions of which are as follows:

Three commissioners are to be appointed by the Governor, for a term of three years each, who shall have the supervision of all companies engaged in the manufacture and sale of gas, and who shall, whenever they find any company violating the provisions of any law, report the same to the attorney general for such action as he may deem best. Local authorities are forbidden to grant a second franchise to a gas company, without a public hearing and notice, and from the decision of such authorities an appeal may be taken, by any person aggrieved, to the Board, whose decision, after public hearing, shall be final.

In order to protect the consumers against the monopolies

thus created, it is provided that the mayor of a city, or the selectmen of a town, or twenty consumers, may petition the board regarding the quality or price of gas, and, after hearing, the board may order the quality improved or the price reduced. The salaries of the members of the board and its expenses are to be assessed on the several companies in proportion to their gross earnings.

Here, then, was a law designed to protect the companies in their territories, and also to protect the consumers from exorbitant charges on the part of the monopoly thus created. These monopolies were not absolute, for it lay in the power of the commissioners to admit a second company into any city or town, if they should deem it wise.

The law also requires the companies to make a return to the board, annually, in such form as it may prescribe, setting forth the expenses and income, and in general the financial affairs of the company, together with such other information as may be called for.

As soon as the commissioners were appointed they began an inspection of the companies, and soon found that the variations in the forms of book-keeping were such that it would be impossible to make an intelligent comparison of the results obtained by the different companies, unless a uniform system of book-keeping was established, and, accordingly, the legislature of 1886, granted authority to the board to require the companies to keep their books in a form to be prescribed by it. At the same time two new features were introduced into the law: the companies were forbidden to issue bonds to an amount greater than their capital stock, and the board was given authority to compel a company to furnish a supply of gas on such terms as might be reasonable.

At about this time the rapid growth of electric lighting began, and many gas companies petitioned the legislature for such amendments to their charters as would enable them to furnish that kind of light also. The legislature of 1887, instead of granting these various petitions, passed a general

law, granting to the Board of Gas Commissioners authority to allow gas companies to engage in such business.

The introduction of this bill into the legislature was the signal for great activity on the part of the electric light companies, and an attempt was made to defeat it, but, eventually, these companies came to the conclusion that they desired also to be placed under the jurisdiction of the board, and, consequently, a law was passed extending the provisions of the laws of 1885 and 1886 to electric light companies, granting them the same protection extended to gas companies and imposing on them the same duties.

In 1888, the powers of the board were further extended, by allowing it to fix the price of gas, on the petition of the company, and by requiring a report from the companies of all accidents due to gas or electricity furnished by them.

The same year a law was passed, which allowed the board to license gas companies to make and sell water gas. The reason for this was to be found in an amendment of the law relating to the inspection of gas, made in 1880, which fixed the legal limit for carbonic oxide at 10 per cent., a restriction which would allow the manufacture of coal gas, but not of water gas. Beginning with 1883, there had been an attempt made each year in the legislature to repeal this restrictive limit, and, finally, in 1888, an act was passed allowing the commissioners to change that limit, if, in their opinion, the gas could be used with safety.

No legislation concerning the board was enacted in 1889, but when, in 1890, it reported its reluctance to certify that any gas could be used with safety and asked for such a modification of the law as would allow it to grant a certificate, the legislature decided to strike out of the inspection law the provision relating to carbonic oxide, and thus leave the manufacture of water gas open to all without restriction.

In 1891, after much agitation, the legislature passed an elaborate act allowing municipal corporations to engage in the lighting business. This act recognizes the principle of non-competition, by requiring the purchase of existing

plants at an appraised valuation, and goes one step further, by requiring a municipality to purchase both the gas and electric plants wherever both kinds of light are supplied by one private corporation, thus cutting off competition between a municipality and a private company, even when the kind of light supplied is not the same.

The Board of Gas Commissioners, or, as its name now reads, the Board of Gas and Electric Light Commissioners, is recognized by this act, and the municipalities engaged in this business are placed under the same regulations regarding methods of book-keeping and returns to the board as are private corporations, and the same power is given to the board to require the supply of light. The statistics which are obtained from these returns, being collected on exactly the same lines for both private and public works, ought to go far towards settling the vexed question of the comparative economy of the two methods of management.

What use will be made of the powers given to municipalities by this act it is yet too early to predict; several towns, wherein at present no plant exists, have taken steps looking towards the erection of a municipal electric station, but in no town has there been any suggestion of the establishment or purchase of a gas plant. Electric lighting has greater fascination for the average citizen than gas, and the fact that an electric plant can be started at less cost than a gas plant has much to do with this, although it is generally conceded that profits from gas have been greater than from electricity.

This, then, being the history of the legislation of the last six years in relation to lighting corporations, the question arises, In what way has the board exercised its powers? A study of its annual reports to the legislature will show that a careful collection has been made of the statistics of the business under its control, and that a considerable degree of publicity has been given to its details.

Coming now to the different features of the law which required the action of the board, we find that, as yet, it has not passed on the question of granting a second franchise in

any place for an illuminating gas company, but that it has, in several instances, refused to allow a second electric light company to enter a field already occupied, and it has laid down the rule that, where one electric light company can hold the field the consumers can be better supplied, and at a permanently lower price than if two were allowed to sink capital in duplicating the plant, and that if prices are too high it is comparatively easy to have them revised.

Upon this last point the board has twice passed—one petition having been received in 1887 from one of the largest cities in the state, and another from a somewhat smaller city was acted on in 1890. Both were heard at great length, and in both cases it was found advisable to recommend a reduction in the price charged—in the first case from $1.80 to $1.50 a thousand feet; and in the other, from $2.00 to $1.80 for small consumers, and from $1.90 to $1.75 for large consumers. The recommendations of the board having been accepted by the companies, it was not necessary for it to use the power to order given it by statute.

No formal orders compelling supply have been issued in the case of gas, but in several cases the board has been able to obtain for the applicant the desired service without formal action. Two cases have been formally acted on where the board was asked to require the supply of electricity to buildings having isolated electric plants, but where the owner did not desire to run the plants in the evening; and in both these cases the supply was ordered. The company has taken the matter into the courts, which have, as yet, taken no action.

The authorization of gas companies to supply electric light has furnished many cases, and has led to the establishment of various precedents. In general, it may be said that such authority has never been granted to a gas company in a locality in which an electric light company existed without the board first being satisfied that a valid contract had been made between the two companies by which the gas company agreed to purchase the electric plant.

In one case, decided in 1890, in a city of considerable size, where the gas company desired to buy out the electric light company, the latter being willing to sell, the board found, on investigation, that both companies were earning a fair rate of interest on the capital invested, and were, therefore, not being injured, and that the people were benefited by the competition between the two kinds of light; it therefore refused to grant the authority desired.

The cases cited show the kind of work the board has done, and the principles on which they were decided.

Since jurisdiction over the electric light companies was given the board, it stands in the relationship of guardian to three distinct interests, namely: the consumers, the gas companies, and the electric light companies; and has for its object the protection of the interests of each.

The capital of the companies is entitled to a fair rate of interest, if that capital is actual and not fictitious; and at the same time the people, who granted the use of the streets for the purpose of carrying on the business, are entitled to the best possible service at the lowest possible price consistent with a fair return on the actual capital employed.

To sum up the Massachusetts method of regulating these lighting companies, we may say that the legislature has delegated its powers in these respects to a permanent body, which can go more thoroughly into the details of these matters than a legislative committee, and can also exercise a quasi-judicial function in determining the law and right of many of the matters brought before it.

Between unrestricted competition, with its waste of capital, and municipal ownership, with its socialistic aspects, there seem to be two methods of state regulation; one, the English, which attempts to make the self-interest of the stockholders act to protect the consumer, and the other, that of Massachusetts, which creates a permanent body to adjudicate such differences as may arise between shareholders and consumers. Both recognize the principle of non-competition.

England is now trying to work out the problem of electric

lighting regulation, and finds it difficult of solution. Massachusetts found her law in relation to gas companies such that, when this need arose, nothing more was necessary than to extend the jurisdiction of an existing board over the new field.

That the regulation of these corporations can be more easily and effectually done by a body outside of the local issues, which do not strictly concern the question in hand, is undoubtedly true; and since the corporations are primarily the creatures of the state, not of the local governing bodies, is it not better that the state, rather than the municipality, should undertake the control? If the principle of non-competition obtains, then regulation in the interest of the consumer must follow.

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ELECTRIC STREET LIGHTING IN CHICAGO.

In the discussion concerning the comparative merits of public and private systems of street lighting, the employment of the comparative statistical method of investigation is rendered difficult by the fact that many cities are, under unequal conditions, lighted partly by public, partly by private systems, as well as by the fact that most cities use several kinds of light, such as gas, electric, vapor and oil. It will therefore be expedient to examine, instead, some individual representative experiment. The experiment fixed on for this purpose is the municipal electric street lighting of Chicago. This experiment is preferred, first, because, while gas lamps still comprise 60 per cent. of all classes of lamps employed for street lighting, electricity is already the favorite means of illumination in cities of less than 100,000 inhabitants, and is rapidly supplanting other kinds of light in cities whose population exceeds that number; secondly, because the administration of municipal affairs in Chicago, perhaps more than in any other city of

the first class, is conducted on business principles, being comparatively free from the influence of federal politics.

The first attempt to establish a municipal electric lighting plant in Chicago was made about twelve years ago, when Mr. John P. Barrett, superintendent of the city telegraph, procured a small dynamo and connected it with an engine in the North Side Water Works, two arc lights being placed on the cupola of the tower. The enterprise met with opposition, however, and the city council directed the dynamo to be sold and the lights to be taken down, which was accordingly done.

The next attempt was made in 1887. In this year a small appropriation was granted for the purpose of lighting up the river front. A small outfit was purchased and operations begun in an abandoned fire engine house. A limited number of lamps was erected, commanding not only the river, but also bridges and viaducts. The effect upon the dark narrow stream, dangerous alike to passing vessels and belated pedestrians along the wharves, was so marked that a larger appropriation was voted, with which to illuminate some of the principal down-town streets. The superiority of electric lights was quickly appreciated by the people, and the councilmen from outlying wards, importuned by the popular demand, asked for the extension of the system. The result was that a resolution was passed to extend it to the whole city.

The plan of the system is as follows: The old city, comprising about 44 square miles, is divided into 12 electric light districts. Each district is to have a power station located as near the centre as possible. From each power station a main subway is built extending across the district from boundary to boundary, and decreasing in duct space from the power station toward the boundaries. Main feeders are run out at right angles to the line of the subway; from the feeders, connections are made with the lamps. On all streets where fire or police boxes, engine houses, or police stations are located, enough duct space is provided to accommodate the under-

ground wires of these departments. Main subways are built of multibular blocks of bituminous concrete laid in the street, and imbedded in three inches of concrete, or simply placed on a foundation of the same material, composed of Portland cement, sand, and lime-stone screenings, and are reached by large octagonal or round manholes; or they are built of cement-lined wrought iron pipes, laid in the streets and imbedded in concrete, composed of Portland cement, sand, and granite screenings. The feeders throughout are two-inch iron and steel pipe laid under the sidewalks, inside the curb wall, or in the street. Where laid in the street, small manholes and hand-holes are used.

The manholes are built of brick, and placed from 235 to 450 feet apart. They average about forty-six inches in length by forty in width, and range from four and a half to nine feet in depth. They are furnished with double iron covers, one of which is set below the grade and made watertight by packing; the other, on a level with the street. All the iron pipe is plugged to remove surrs, and reamed at the ends. The conduits and pipes are laid with a pitch of from six inches to one foot, draining into the manholes, thus disposing of all drip from condensed moisture. The conduits are practically gas and watertight. The insulation resistance of the electric light cables is 500 megohms per mile. The electric light circuit has a voltage of from 2500 to 3000 volts and a current of from nine to eighteen amperes, or a voltage of from 900 to 1200 volts and a current of from eighteen to twenty amperes.

The electric light post has been designed by Mr. Barrett, and possesses some peculiar advantages. It consists of a hollow iron base extending from the sidewalk to a height of seven feet; through this hollow iron base a hollow wooden pole extends to a height of nine feet above the iron base, being securely fastened to the top and bottom of the same. There are two doors on opposite sides of the iron base, at a height of five feet from the sidewalk. Near the bottom of the base is a removable panel. A frame and hood extending

from the top of the pole have but one standard or support. Inside one of the doors is placed a wooden box containing a double pole arc-light switch ; inside the other is a receptacle for a fire alarm box. The panel can be removed to facilitate the handling of cables.

This electric light post offers increased safety to human life, as, in case of accident to the lamp, the workman can disconnect it from the rest of the circuit by " throwing " the switch, without a possibility of contact with the conductor. The wooden pole is also a semi-insulator, and is safer to work from than an iron pole, should it be necessary to regulate the lamp while burning. Furthermore the hollow space between the iron and wooden poles not only affords a receptacle for the electric light switch and fire alarm box, but, if it should be desired to furnish incandescent light, there will also be room for a converter by which a high tension current can be changed to a low tension current. The single standard or support throws off only one shadow, and that can be directed against the part of the nearest building where it will be least objectionable.

The whole system, when completed, will contain 7350 lights. According to the latest published report of the Commissioner of Public Works, namely, that for 1890, 930 arc lights of 2000 candle power have been placed in position, leaving a balance to be provided of 6420. Of these 930 electric arc lights, 900 displace 3621 gas lights. According to the same report, the system has been partly perfected in four districts. The work is being rapidly pushed, $556,000.00 having already been expended in the organization and maintenance of the electric light service; and the whole system will probably be completed in time for the World's Fair. No district has, as yet, received its full quota of lamps.

In lighting only a portion of a district, the proportionate cost per lamp will, of course, be much greater than if the whole district could be lighted at once, as the land, buildings, and subways must be provided for the entire district,

while only a portion of them is used. However, the present average annual cost of one 2000 C. P. arc light is $83.00—according to later statistics, in Census Bulletin No. 100, $68.00. The estimated average annual cost of the same light when the system shall be completed is about $50.00.

While, under the present unfavorable conditions, the cost of the electric lights is a trifle greater than the cost of the gas lights displaced by them, nevertheless, when the comparison is made in candle power, an enormous difference in favor of the electric lights becomes apparent, as the following table shows :—

Cost of 900 2000-C.P. arc lights, $83.00, ...	$74,700 00
" " 3621 20-C.P. gas lights, $20.00, ...	$72,400 00
Total candle power of 900 2000 C.P. arc lights, ...	1,800,000
" " " of 3621 gas lights, 20-C.P., ...	72,420
Cost per candle power for arc lights, ...	$0 04
" " " " " gas lights, ...	$1 00

An interesting comparison might be instituted between the cost per lamp of electric light in Chicago and that of other cities, but this would, in all fairness, involve a detailed technical description of the several systems. Besides, an interesting statistical comparison, by Victor Rosewater, between public and private electric lighting systems may be found in the *Independent* for March 20, 1890. It may not be out of place, however, to state the bare fact that, according to the eleventh census, Denver is lighted at an average annual cost per electric light of $58.46, while San Francisco pays $440.67 and Boston $237.25 per light.

From the figures given above, it is evident that a saving will accrue to Chicago by the adoption of her electric lighting system. She will be better lighted and her actual expenses lessened. While she has been paying $600,000 annually to private gas companies for lighting her streets, she will in the future be able to light the same territory for a third of that sum.

Taking it for granted that public lighting is cheaper than private, for no private corporation will be found to undertake

the enterprise without profit, two points remain to be considered. It has been objected that municipal ownership of electric lighting systems breeds corruption and encourages inefficiency. Both of these objections may, in view of the results of the experiment in Chicago, be dismissed with a single sentence. The electric lighting service of Chicago, so far as established, is claimed by experts to be perhaps the best in existence, while not the slightest suspicion has ever attached to the honesty of its administration.

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